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2 / 3 DWPX (1 / 2) - ©Thomson Derwent - image

**AN** - 2003-015928 [01]  
**XP** - N2003-011863  
**TI** - Photonic band-gap light-emitting **fiber** for laser, has lattice structures with multiple high refractive index inclusions which limit photon emission along axial directions parallel to **fiber** length  
**DC** - P81 V07  
**PA** - (VOEV/) VOEVODKIN G  
(INTE-) INTELLIGENT OPTICAL SYSTEMS INC  
**IN** - VOEVODKIN G  
**NP** - 2  
**NC** - 1  
**PN** - US20020102081 A1 20020801 DW2003-01 G02B-006/16 6p \*  
AP: 2001US-0774967 20010131  
  
US6470127 B2 20021022 DW2003-01 G02B-006/02  
AP: 2001US-0774967 20010131  
**PR** - 2001US-0774967 20010131  
**IC** - G02B-006/02 G02B-006/16  
**AB** - US20020102081 A  
NOVELTY - Two-dimensional light guiding dielectric crystal lattice structures have multiple high refractive index inclusions (31) which limit the manifold of emission modes to those that emit photons only in the axial direction parallel to the **fiber** length.  
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for optical **fiber amplifier** apparatus.  
USE - For use in laser, **amplifier** and optical device application.  
ADVANTAGE - Increases fluorescence and scintillation collection efficiency by limiting photon emission to axial direction parallel with the **fiber** length and also dramatically reduces the transmission losses by guiding light in a single propagation mode in a large diameter single mode structure.  
DESCRIPTION OF DRAWING(S) - The figure shows an illustrative view of the photonic band-gap (**PBG**) scintillating light **fiber**.  
High refractive index inclusions 31(Dwg.3/5)  
**MC** - EPI: V07-F01A1  
**UP** - 2003-01  
**UP4** - 2003-01  
**UE** - 2003-01  
**UE4** - 2003-01

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3 / 3 DWPX (2 / 2) - ©Thomson Derwent - image

**AN** - 2000-097581 [08]

dramatically reduces the transmission losses by guiding light in a single propagation mode in a large diameter single mode structure.

DESCRIPTION OF DRAWING(S) - The figure shows an illustrative view of the **photonic band-gap (PBG)** scintillating light **fiber**.  
High refractive index inclusions 31(Dwg.3/5)

**MC** - EPI: V07-F01A1  
**UP** - 2003-01  
**UP4** - 2003-01  
**UE** - 2003-01  
**UE4** - 2003-01

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**AN** - 2000-097581 [08]  
**XR** - 2000-097580  
**XA** - C2000-028345  
**XP** - N2000-075404  
**TI** - **Photonic band gap fiber** for communication purposes and for **fiber** laser or **fiber amplifier** applications  
**DC** - L03 P81 V07 V08  
**PA** - (BARK/) BARKOU S E  
(BJAR/) BJARKLEV A O  
(BROE/) BROENG J  
(CRYS-) CRYSTAL FIBRE AS  
**IN** - BARKOU SE; BJARKLEV AO; BROENG J  
**NP** - 5  
**NC** - 87  
**PN** - WO9964904 A1 19991216 DW2000-08 G02B-006/12 Eng 159 \*  
AP: 1999WO-DK00193 19990330  
DSNW: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE  
ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS  
LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL  
TJ TM TR TT UA UG US UZ VN YU ZA ZW  
DSRW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC  
MW NL OA PT SD SE SL SZ UG ZW

AU9930260 A 19991230 DW2000-22 G02B-006/12

FD: Based on WO9964904

AP: 1999AU-0030260 19990330

EP1086393 A1 20010328 DW2001-18 G02B-006/12 Eng

FD: Based on WO9964904

AP: 1999EP-0911645 19990330; 1999WO-DK00193 19990330

DSR: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

JP2002517794 W 20020618 DW2002-42 G02B-006/20 160

FD: Based on WO9964904

AP: 1999WO-DK00193 19990330; 2000JP-0553843 19990330

AU-755223 B 20021205 DW2003-05 G02B-006/12

FD: Previous Publ. AU9930260; Based on WO9964904

AP: 1999AU-0030260 19990330

**PR** - 1998DK-0000779 19980609

**IC** - G02B-006/12 G02B-006/20 H01S-003/06

**AB** - WO9964904 A

**NOVELTY** - Optical **fiber** comprises a core and a cladding region with two-dimensionally periodic structure(s) comprising primary, elongated elements each with a center axis extending in the longitudinal direction of the waveguide. The primary elements have a refractive index lower than a refractive index of any material adjacent to the primary or elongated elements.

**DETAILED DESCRIPTION** - An optical **fiber** with a waveguide structure having a longitudinal direction comprises a core region and a cladding region extending along the longitudinal direction. The cladding region comprises a two-dimensionally periodic structure(s) comprising primary, elongated elements each having a center axis. The primary elements have a refractive index which is lower than the refractive index of any material adjacent to the primary elements or elongated elements. The periodic structure, which is in a cross-section perpendicular to the longitudinal direction, is defined by at least one unit cell. Each unit cell has:

(a) a first circle (circumscribing the polygon) having the largest circular area with its center not positioned outside the unit cell and not enclosed in any part of any primary elements; and

(b) further elongated element(s), which does not cover the center of the first circle, each having an area not exceeding 1/6 of primary element's area and a refractive index.

Alternatively each unit cell, the product of the largest index of refraction within the first circle (nd) and the distance between the center of the first circle of the unit cell and the center of the first circle of an adjacent unit cell is greater than the product of the largest index of refraction positioned outside any of the first circles of the unit cells (nud), the smallest distance between center axes of two primary elements within the periodic structure and the square root of three (preferably 2, 3, 4, 6 or 10). For the elongated elements, the sum of all their areas comprised within the unit cell is larger than 1.2 times the area of the primary element.

**INDEPENDENT CLAIMS** are also included for:

(A) an optical **fiber** having a cladding region with two-dimensionally periodic structure(s) defined by a unit cell and that for each unit cell, polygon(s) are defined as a first polygon having its vertices at centers of first primary elements and each area of the unit cell, if any, is not comprised within the first polygon and an additional polygon has its vertices at centers of additional primary elements;

(B) sensor for sensing/detecting liquid or gas characteristic(s) comprising a length of optical **fiber**, means for providing the liquid or gas into the void of the core region, means for introducing light into the core region and a light detector emitted from the **fiber**;

(C) a **fiber amplifier** comprising a length of optical **fiber** and a means for providing pump radiation to the dopant material; and

(D) a **fiber laser** for outputting laser radiation comprising a length of optical **fiber**, a

means for providing pump radiation to the dopant material and a feedback means for selectively feeding back at least part of the amplified optical signal so as to repeatedly pass the amplified optical signal through the length of the optical **fiber**.

USE - The **photonic band gap fiber** is used in communication purposes and for applications for **fiber** lasers or **fiber** amplifiers.

ADVANTAGE - The periodic cladding structure exhibits a **PBG** effect. The **PBG** guiding fibers are highly flexible and are easy to manufacture. By the **PBG** effect, it is possible to open up forbidden frequencies regions by designing the micro-structured cladding correctly, and by introducing a defect site to localize light within this region. By independently optimizing the cladding and the defect structures, it is possible to tailor the properties of the fibers.

DESCRIPTION OF DRAWING(S) - The figures shows a basic Honeycomb lattice and a corresponding unit cell.(Dwg.5/83)

**MC** - CPI: L03-F02 L03-G02  
EPI: V07-F01A1 V07-F01B1 V07-K01C2 V08-A04C2

**UP** - 2000-08

**UE** - 2000-22; 2001-18; 2002-42; 2003-05

**UE4** - 2001-04; 2002-07; 2003-01

Query/Command : his

Databases : INSPEC, JAPIO, DWPX

SS Results

1	2	..INDEX
INSPEC		MARONEY A
2	1	..INDEX
INSPEC		REYNODS AJ
		INSPEC 4158
		JAPIO 54
		DWPX 154
3	4366	(PHOTONIC 1W BAND 1W GAP) OR PBG
		INSPEC 81686
		JAPIO 134326
		DWPX 202258
4	418270	AMPLIFY OR AMPLIFIER OR AMPLIFICATION OR AMPLIFIES
		INSPEC 67
		JAPIO 1
		DWPX 6
5	74	3 AND 4
		INSPEC 144910
		JAPIO 164644
		DWPX 370125
6	679679	FIBER OR FIBRE
		INSPEC 11
		JAPIO 0
		DWPX 3
7	14	5 AND 6

Search statement 8

Query/Command : pbg

INSPEC	673
JAPIO	20

index.

Alternatively each unit cell, the product of the largest index of refraction within the first circle (nd) and the distance between the center of the first circle of the unit cell and the center of the first circle of an adjacent unit cell is greater than the product of the largest index of refraction positioned outside any of the first circles of the unit cells (nud), the smallest distance between center axes of two primary elements within the periodic structure and the square root of three (preferably 2, 3, 4, 6 or 10). For the elongated elements, the sum of all their areas comprised within the unit cell is larger than 1.2 times the area of the primary element.

INDEPENDENT CLAIMS are also included for:

(A) an optical fiber having a **cladding** region with two-dimensionally periodic structure(s) defined by a unit cell and that for each unit cell, polygon(s) are defined as a first polygon having its vertices at centers of first primary elements and each area of the unit cell, if any, is not comprised within the first polygon and an additional polygon has its vertices at centers of additional primary elements;

(B) sensor for sensing/detecting liquid or gas characteristic(s) comprising a length of optical fiber, means for providing the liquid or gas into the void of the **core** region, means for introducing light into the **core** region and a light detector emitted from the fiber;

(C) a fiber **amplifier** comprising a length of optical fiber and a means for providing pump radiation to the dopant material; and

(D) a fiber laser for outputting laser radiation comprising a length of optical fiber, a means for providing pump radiation to the dopant material and a feedback means for selectively feeding back at least part of the amplified optical signal so as to repeatedly pass the amplified optical signal through the length of the optical fiber.

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MC - CPI: L03-F02 L03-G02  
EPI: V07-F01A1 V07-F01B1 V07-K01C2 V08-A04C2

UP - 2000-08

UE - 2000-22; 2001-18; 2002-42; 2003-05

UE4 - 2001-04; 2002-07; 2003-01

Query/Command : his

Databases : INSPEC, JAPIO, DWPX

SS Results

1	2	..INDEX
INSPEC		MARONEY A
2	1	..INDEX
INSPEC		REYNODS AJ

```

INSPEC          4158
JAPIO           54
DWPX            154
3      4366      (PHOTONIC 1W BAND 1W GAP) OR PBG
INSPEC          81686
JAPIO          134326
DWPX           202258
4      418270    AMPLIFY OR AMPLIFIER OR AMPLIFICATION OR AMPLIFIES
INSPEC          67
JAPIO           1
DWPX            6
5      74      3 AND      4

INSPEC          144910
JAPIO          164644
DWPX           370125
6      679679    FIBER OR FIBRE
INSPEC          11
JAPIO           0
DWPX            3
7      14      5 AND      6
INSPEC          673
JAPIO           20
DWPX            54
8      747      PBG
INSPEC          24
JAPIO           1
DWPX            5
9      30      8 AND      4
INSPEC          1
JAPIO           0
DWPX            2

10      3      6 AND      9
INSPEC          3882
JAPIO          8252
DWPX           9848
11      21982    CORE AND CLAD????
INSPEC          1
JAPIO           0
DWPX            1
12      2      ( 3 OR      8) AND      11 AND      4

```

Search statement 13

**Query/Command : stop hold**

Session finished: 01 AUG 2003 Time 16:18:53

INSPEC - Time in minutes : 11,59

The cost estimation below is based on Questel's standard price list

	Estimated cost :	17.38 USD
Records displayed and billed :	6	
	Estimated cost :	15.60 USD
Cost estimated for the last database search :	32.98 USD	
Estimated total session cost :	33.65 USD	

JAPIO - Time in minutes : 1,84

The cost estimation below is based on Questel's standard price list

	Estimated cost :	3.52 USD
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Cost estimated for the last database search : 3.52 USD  
Estimated total session cost : 37.17 USD

DWPX - Time in minutes : 9,53  
The cost estimation below is based on Questel's  
standard price list

	Estimated cost :	28.01 USD
Records displayed and billed :	8	
	Estimated cost :	7.85 USD
Cost estimated for the last database search :	35.86 USD	
Estimated total session cost :	73.03 USD	

Your session will be retained for 2 hours.

QUESTEL.ORBITE thanks you. Hope to hear from you again soon.